CLAIMS

1. Apparatus for scanning a beam across a surface, comprising:

a scanner that scans a pulsed laser beam across a surface; and

a position indicator receiving an input from said pulsed laser beam at a plurality of locations across said surface, and outputting position indications indicating a position of said pulsed laser beam along said surface.

2. Apparatus according to claim 1 wherein the surface includes a plurality of spaced markings, such that a modulated pulsed laser beam is reflected from said surface.

3. Apparatus according to claim 2 wherein the position indicator includes a detector, wherein said detector receives said modulated pulsed laser beam and provides a modulated signal.

4. Apparatus according to claim 3 and wherein the response time of said detector is slower than a pulse rate of said pulses, such that said detector outputs a signal that generally does not distinguish said pulses.

5. Apparatus according to claim 1 and including a data modulator modulating a data bearing laser beam in response to said position indications.

6. Apparatus according claim 1 and including:

a clock generator generating a clock signal; and

a controller that receives said position indications and controls the clock generator responsive to said position indications.

7. Apparatus according to claim 6 and including a data modulator modulating a data bearing laser beam in response to said clock signal.

8. Apparatus for scanning a beam across a surface, comprising:

a first beam;

a modulator that receives said first beam at an input portion thereof, and produces a modulated beam at an exit portion thereof, based on a modulation signal thereto;

a second beam, said second beam being pulsed;

a scanner that receives the modulated beam and the second beam and scans the modulated beam in a first beam path across the surface and the second beam along a second beam path substantially parallel to the first beam path;

a sensor sensing the second beam and periodically indicating a sensed position of said second beam at ones of possible locations in said second beam path; and

a controller that provides said modulation signal to said modulator at least partially in response to the sensed position of said second beam in said second beam path.

9. Apparatus according to claim 8 wherein the modulation signal is controlled at a data rate and wherein the first and second beams are pulsed at a rate substantially higher than the data rate.

10. Apparatus according to claim 8 wherein the modulation signal is controlled at a data rate and wherein the first and second beams are pulsed at a rate lower than the data rate.

11. Apparatus according to claim 8 wherein the modulation signal is controlled at a data rate and wherein the first and second beams are pulsed at a rate substantially the same as the data rate.

12. Apparatus according to claim 8 wherein the first and second beams have substantially the same wavelengths.

13. Apparatus according to claim 8 wherein the first beam includes energy at a wavelength different from the wavelength of the second beam.

14. Apparatus according to claim 8 and including:

a marked scale upon which the second pulsed beam impinges, such that the second beam is reflected therefrom to form a modulated reflected pulsed beam.

15. Apparatus according to claim 14 wherein the second beam impinges on the scale at an angle to its surface, such that the modulated reflected pulsed beam is reflected along an axis different from the axis along which the second pulsed beam impinges on the scale.

16. Apparatus according to claim 14 wherein the sensor includes a detector that receives said modulated reflected pulsed beam and generates a modulated signal therefrom, said controller providing said modulation, based on a timing coordinated with said modulated signal.

17. Apparatus according to claim 16 wherein the controller includes:

a clock generator that receives the modulated signal and generates a timing clock having a clock frequency that is controllably related to the frequency of the modulated signal.

18. Apparatus according to claim 17 wherein the clock generator includes:

a first generator that generates an intermediate clock and an inverse intermediate clock having the same frequency and inverse phases; and

switching circuitry having two inputs that receive the intermediate clock and the inverse intermediate clock respectively and a timing clock output to which the clock at one of the two inputs is selectively switched, such that the average frequency of the timing clock at the output is controlled by said selective switching.

19. Apparatus according to claim 18 wherein the switching circuitry switches said inputs to said output responsive to clock correction information.

20. Apparatus according to claim 16, and including:

a data store containing stored modulation information, which passes said information to said modulator for modulating the first beam, based on timing of said stable clock.

21. Apparatus according to claim 8 wherein the modulated light beam scans over the surface in a first direction and wherein the surface moves in a direction perpendicular to the direction of scanning such that the surface is illuminated by a raster scan.

22. Apparatus according to claim 8 wherein the surface comprises a photosensitive photoresist.

23. Apparatus according to claim 8 wherein the first beam and the second beam each comprise a laser beam.

24. Apparatus according to claim 8 wherein the modulation of the modulated light beam is asynchronous with the pulses of the second pulsed beam.

25. A system for recording a pattern on a substrate, comprising:

a pulsed laser outputting a pulsed laser beam;

a modulator that receives the pulsed laser beam and produces a modulated pulsed beam in response to a pixel defining signal;

a scanner that receives the modulated pulsed beam and scans it across the surface of the substrate to record a pattern defined by pixels on said surface,

wherein a rise time of the pixel defining signal is less than a pixel period of the pixels.

26. A method for manufacturing electrical circuits, comprising:

scanning a pulsed laser beam across a marked surface to provide a position modulated pulsed laser beam;

sensing said position modulated pulsed laser beam and at least partly in response to said sensing outputting position indications indicating a position of said pulsed laser beam on said marked surface;

scanning a data modulated laser beam across a photosensitized surface formed on an electrical circuit substrate; and

modulating said data modulated laser beam in response to said position indications to expose said photosensitizes surface according to a predetermined electrical circuit pattern.

27. Apparatus for manufacturing electrical circuits, comprising:

a scanner scanning a pulsed laser beam across a marked surface to provide a position modulated pulsed laser beam and scanning a data modulated laser beam across a photosensitized surface formed on an electrical circuit substrate;

a beam position determinator operative to sense said position modulated pulsed laser beam and to output a position indication signal indicating a position of said pulsed laser beam on said marked surface; and

a modulator modulating said data modulated laser beam at least partly in response to said position indication signal to record a predetermined pattern on said photosensitized surface.